

## Notes on CYPHOSTEMMA

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This article aims to contribute to knowledge of the genus *Cyphostemma* (Planch.) Alston in cultivation, on the basis of my personal experience. It is thus a sort of technical guide dedicated to enthusiasts who cultivate these plants. With regard to taxonomy, I will only indicate some essential points, willingly leaving the details to those who are more familiar with the study of this vast family, that of the Vitaceae; works dealing with this family are available, but not easily. Until about 70 years ago, there was only a single genus, *Cissus* L., close to *Vitis* L., which included the three sections *Eucissus*, *Cayratia* Juss. and *Cyphostemma*. Subsequently, *Cayratia* and *Cyphostemma* were elevated to the rank of genus: *Cayratia* represents a group of plants with tendrils and no tendency towards succulence, whereas the situation is less clear with regard to *Cyphostemma* and *Cissus*. The distinctive characteristic of the former is that of being succulent (caudiciform) and of only growing in the Old World, whereas *Cissus* contains both succulent species (although not strictly caudiciform) and non-succulent species, and its areale also includes the New World. Although the significance of these characteristics is not such as to justify separation of the two groups, DNA analysis appears to show without any doubt that *Cissus* and *Cyphostemma* are two separate genera, of which *Cyphostemma* is the branch with most affinity to *Vitis*.

### CYPHOSTEMMA AND VITIS, CLOSE RELATIVES?

In the florilegium of the plants that have accompanied mankind's cultural evolution, the grapevine undoubtedly occupies a prominent place as the generous producer of fragrant grapes, whose fermented juice - wine - has intoxicated us for thousands of years. It may seem strange that this species of sarmentose plants also boasts some relatives, and not particularly distant ones, that are succulents properly speaking, in the 'caudiciform' category. The genus *Cyphostemma* shows some significant similarities with *Vitis*, such as the flowers, very small and collected in racemes, that are similar although less numerous and with shorter filaments. The fruits are just like small grapes, with a sharp flavour due to the high tannin content and with a seed twice the size of a grape seed. The leaves are often of the palmate shape of vine leaves, as in *C. juttae* (Dinter & Gilg) Descoings, but more frequently are profoundly incised and divided into lobes. In some species the succulent tissue present in the leaves makes them thick, compact and leathery. In *C. uter* (Exell & Mendonca) Descoings, *C. bainesii* (Hook. f.) Descoings and *C. humile* (N.E. Br.) Desc. ex Wild & R.B. Drumm, the entire leaf epidermis is covered with thin protective hairs, which limit loss of water during transpiration, whereas in *C. betiforme* (Chiov.) K. Vollesen, *C. currorii* (Hook. f.) Descoings and *C. juttae* the epidermis is perfectly smooth and shiny so as to reflect the sunlight efficiently. This latter species, more than the others, is known to secrete a thin pruinous layer that gives the leaves a turquoise colour, sometimes tinged with pink along the leaf-edges in plants grown outdoors in full sunlight. In all the species, the leaves take on a typical conformation in strong sunlight: the lamina curves like a spoon so that the tissue is never directly exposed to incident light. The stem in *Cyphostemma* species is in absolute the most characteristic and derived organ, with respect to the genus *Vitis*, from which it is differentiated both in that it incorporates succulent tissues, but above all for the deciduous nature of the terminal portions. At the end of the season, *Cyphostemmas* not only lose their leaves, but also the terminal stretch of the branches, thin and less well developed. With regard to the shape of the stem, there is a uniform variation among the various species, which range from climbing plants, still in the form of lianas, such as *C. greenwayi* Verdcourt, in which the basal caudex has rather reduced development, to the underground tuberous development found in *C. humile*, entirely given over to the function of accumulating reserves of water and mineral salts. All the

other species range between these two extremes: in particular, *C. cramerianum* already has a succulent basal portion, but still presents long liana-like stems with tendrils, *C. juttae* and *C. uter* produce densely-branched stocky stems with a height of 1-2 meters, whereas *C. bainesii* forms conical trunks that do not reach more than 60 cm in height.

## VARIATIONS IN ECOLOGICAL FORM

The ecological form of growth is, as the term suggests, the habit of growth that characterises a plant, expressed as an adaptation to the ecological conditions in which it lives. On the basis of this characteristic it is therefore possible to interpret the needs of a specific species.

### SARMENTOSE LIANA-LIKE HABIT

(*C. greenwayi*) These species are similar to the genera *Vitis* and *Cissus*, with a rapidly-growing stem, elongated internodes and the presence of tendrils. The leaves and stem are little succulent or not at all. ==Ecology:== these species are adapted to conditions of strong competition with vegetation of the thorny brush type, in which they grow by attaching themselves with their tendrils, and using woody bushes and trees as a support, until they reach the ideal condition of light. The climate is characterised by dry winters and rainy summers, with heavy rainfall. ==In cultivation:== these plants do not like to be exposed to full sunlight or very dry and ventilated conditions. When the substratum is dry the plants rapidly suffer from the lack of water and the leaves and tips of the stems tend to lose turgidity and become flaccid, and growth of the entire plant slows visibly. They have an abundant fascicular root system, which requires large containers. The soil should be well-drained and with a good organic content (peat, leaf-mould for 50% -80%).

### BUSHY HABIT

These species are typically caudiciform, with a conical trunk that it is very wide at the base, with varying degrees of branching. The leaves are succulent, leathery, with a trichomatous<sup>1)</sup> epidermis protected by waxy secretions. ==Ecology:== these species are adapted to very arid conditions with little competition, and form solitary succulent bushes that may be of considerable size, in areas of dry Savannah with seasonal herbaceous plants of small size. The most xerophytic forms (for example *C. uter*) colonise very dry rocky deserts. Their root apparatus consists of short, thick branches whose function is chiefly to provide mechanical support, from which absorbent root hairs grow when rainfall occurs. The climate is characterised by an intense rainy season, which in the case of the more succulent species may assume an irregular nature, in which intense rainfall alternates with dry periods of varying length. ==In cultivation:== these plants prefer hot or very hot positions, exposed to strong sunlight and well ventilated. They require a substratum with a dominant mineral component, well drained. The container must be of good size and depth. Terracotta containers are recommended, with a mulch<sup>2)</sup>

consisting of large rock fragments, beneath which the absorbent root hairs can develop. Watering must be such that the substratum dries completely before re-watering. In this sense, particular care must be paid to the species *C. uter* and *C. betiforme*, which are the most delicate. In particular *C. betiforme*, a species originating from the equatorial deserts of Somalia, is the most thermophilic species, and must be kept in a high temperature including during the winter.

## UNDERGROUND HABIT

The only species considered in this group is *C. humile*, which forms enlarged underground stems, like turnips, with buds lying just beneath the surface of the soil.

Ecology: technically this type of growth is known as 'geophytic', given that the buds in the inactive phase are hidden under the soil. This is an ecological form that provides complete protection against drying by exposure to the sun during the inactive winter phase, from animal predators and from damage due to grass fires. In the rainy season the plant rapidly develops new growth, consisting of deciduous stems with small erect and tomentose leaves. In the same way, growth may be renewed whenever damage occurs that compromises functionality, as in the case of fire, very common in the Savannah zones where this species is widespread. In cultivation: plants of this species are sensitive to water stagnation, but come from areas where there is a good content of organic substance in the soil, deriving from the seasonal grassy cover. The substratum should be of a balanced type, with equal amounts of organic and mineral components. The container must be at least twice the depth of the height of the napiform stem, which must be kept entirely buried and covered by one or two cm of soil, as in nature. In this case mulching is not necessary.

## A SKIN FOREVER YOUNG

The epidermis of the stem deserves a specific description. In *Vitis*, as in other woody plants, the growth of the stem causes laceration of the epidermis, present only in the young phase, when it collaborates with the leaves in carrying out photosynthesis. After it degenerates the plant produces the rhytidoma, a layer of scales of cork (improperly called 'bark') that protects the underlying conducting tissues (the so-called 'phellogen'). In the *Cyphostemma* species with enlarged stem, on the contrary, a curious character is present that represents a significant ecological adaptation: the capability to completely renew the epidermis at each vegetative cycle. When the old 'skin' is detached in the form of large papery patches, the new epidermis is exposed, green and thus capable of photosynthesis, above all useful in the dry season when the leaves have not yet grown. It should be said that, in this case, the photosynthesis function is reduced, given that the stomata that ensure gas exchange are not present, but there are only a few isolated openings, the lenticels. However, these enable in any case absorption of CO<sub>2</sub>, and thus production of a certain amount of sugar. This particular character, of the epidermis that is continually renewed, is not only present in *Cyphostemma*, but has evolved in a convergent manner also in succulent species belonging to other families, such as in *Sedum furfuraceum* from Mexico and *Tylecodon* from South Africa (Crassulaceae), *Bursera* and *Commiphora* from Central America and East Africa (Burseraceae), *Othonna* from South Africa (Asteraceae) and to a lesser extent also in *Oxalis* from Chile (Oxalidaceae). It is therefore probable that this is a character that gives a certain advantage in terms of adaptation, possibly connected to the opportunity it gives these plants of carrying out photosynthesis even when environmental conditions do not enable the production of leaves.

## PROPAGATION

Propagation of the *Cyphostemmas* is traditionally by seed. It is reported that in South Africa they are sown by scattering the seeds onto the ground. The small patch of land is then left in the care of the tropical climate, which causes gradual germination of the seedlings over a number of years (Specks, personal communication). Also in captivity I have noticed that the seeds remain vital up to five years after sowing, so that, when the first seedlings that germinate are repotted, it is good practice to place

the soil in which they were sown on the surface of the new pots. The soil I have always used is standard soil for succulents mixed with silicon sand. The seeds should be covered with 2 mm of fine sand. I have always had best results by sowing in mid-summer: it appears that heat aids germination.

Propagation through stem cuttings is also relatively simple, but usually the value of our specimen comes from its age, so that pruning rarely produces cuttings. The need to attempt to save a plant diseased at the base occurs much more frequently. In some cases of winter rot I have been able to remove the tips of the branches and keep them dry until summer, when they have rooted and began to grow again normally.

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SysTax - a Database System for Systematics and Taxonomy,

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1)

Trichomatous = covered with trichomas, hair-like structure consisting of a single epidermis cell growing outwards.

2)

Mulch: in agriculture, a layer of material placed on the soil to low evaporation and stop weeds from growing.

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